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Observations of Phenomena of Jupiter's Satellites at Windsor, New South Wales, in the Year 1891.

By John Tebbutt.

Day of Obs. 1891.	Satellite.	Phenomenon.	Phase.	Aperture of Telescope.	Mag. Power.	Greenwich Mean Time of Observation. h m	Mean Time of *Nautical Almanac.* h m s
Aug. 20	III.	Tr. Egr.	Int. contact	8-inch	95	0 53 1	1 2
20	III.	,,	Bisection	,,	,,	0 57 6	
20	III.	,,	Ext. contact	,,	,,	1 1 20	
Sept. 2	II.	Ecl. D.	Last seen	,,	170	23 59 53	23 59 39
3	I.	Tr. Egr.	Int. contact	,,	,,	0 32 8	0 35
3	I.	,,	Bisection	,,	,,	0 33 38	
3	I.	,,	Ext. contact	,,	,,	0 34 57	
10		Occ. D.	First contact	4½-inch	120	21 14 18	21 16
10	I.	,,	Bisection	,,	,,	21 16 47	
10	I.	Ecl. R.	First seen	8-inch	170	23 41 1	23 40 58
11	I.	Tr. Egr.	Bisection	4½-inch	180	20 42 33	20 44
11	I.	,,	Ext. contact	,,	,,	20 45 3	
11	Shd. I.	,,	Int. contact	,,	,,	20 50 12	20 55
11	Shd. I.	,,	Bisection	,,	,,	20 52 12	
11	Shd. I.	,,	Ext. contact	,,	,,	20 52 57	

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Day of Obs. 1891.	Satellite.	Phenomenon.	Phase.	Aperture of Telescope.	Mag. Power.	Greenwich Mean Time of Observation. h m s	Mean Time of *Nautical Almanac.* h m s
Sept. 11	II.	Tr. Ingr.	Ext. contact	4½-inch	180	21 1 15	21 4
11	II.	”	Bisection	”	”	21 4 5	
11	II.	”	Int. contact	”	”	21 5 40	
11	II.	Tr. Egr.	Int. contact	”	120	23 50 52	23 55
11	II.	”	Bisection	”	”	23 51 42	
11	II.	”	Ext. contact	”	”	23 55 1	
18	I.	”	Int. contact	8-inch	170	22 22 33	22 28
18	I.	”	Bisection	”	”	22 25 22	
18	I.	”	Ext. contact	”	”	22 27 32	
18	II.	Tr. Ingr.	Ext. contact	”	”	23 15 39	23 21
18	II.	”	Bisection	”	”	23 18 28	
18	II.	”	Int. contact	”	”	23 20 48	
20	II.	Ecl. R.	First seen	”	”	21 14 46	21 14 3
20	II.	”	Full brightness	”	”	21 16 46	
27	II.	”	First seen	”	”	23 49 31	23 49 40
27	II.	”	Full brightness	”	”	23 52 9	
Oct. 1	III.	Tr. Egr.	Int. contact	”	230	20 40 45	20 48
1	III.	”	Bisection	”	”	20 44 15	
1	III.	”	Ext. contact	”	”	20 48 44	

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Day of Obs. 1891.	Satellite.	Phenomenon.	Phase.	Aperture of Telescope.	Mag. Power.	Greenwich Mean Time of Observation. h m s	Mean Time of *Nautical Almanac.* h m s
Oct. 3	I.	Ecl. R.	First seen	8-inch	230	23 55 41	23 55 41
3	I.	,,	Full brightness	,,	,,	23 58 0	
4	I.	Tr. Egr.	Int. contact	,,	,,	20 19 42	20 24
4	I.	,,	Bisection	,,	,,	20 22 17	
4	I.	,,	Ext. contact	,,	,,	20 24 21	
4	II.	Occ. D.	First contact	,,	,,	22 9 14	22 10
4	II.	,,	Bisection	,,	,,	22 11 23	
4	II.	,,	Last seen	,,	,,	22 13 3	
8	III.	Tr. Ingr.	Ext. contact	,,	130	20 51 11	20 49
8	III.	,,	Bisection	,,	,,	20 55 20	
8	III.	,,	Int. contact	,,	,,	20 59 14	
9	III.	Tr. Egr.	Int. contact	,,	110	0 5 3	0 13
9	III.	,,	Bisection	,,	130	0 8 33	
9	III.	,,	Ext. contact	,,	,,	0 13 32	
9	Shd. III.	Tr. Ingr.	Int. contact	,,	,,	0 14 32	0 6
10	I.	Occ. D.	First contact	,,	170	22 43 14	22 44
10	I.	,,	Bisection	,,	,,	22 45 29	
10	I.	,,	Last seen	,,	,,	22 46 18	

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Day of Obs. 1891.		Satellite.	Phenomenon.	Phase.	Aperture of Telescope.	Mag. Power.	Greenwich Mean Time of Observation. h m s	Mean Time of *Nautical. Almanac* h m s
Oct.	11	I.	Tr. Egr.	Int. contact	8-inch	170	22 7 6	22 11
	11	I.	,,	Bisection	,,	,,	22 8 56	
	11	I.	,,	Ext. contact	,,	,,	22 10 55	
	12	I.	Ecl. R.	First seen	,,	,,	20 19 56	20 19 57
	12	I.	,,	Full brightness	,,	,,	20 21 44	
	14	IV.	Occ. R.	Bisection	,,	,,	21 20 5	21 28
	14	IV.	,,	Last contact	,,	,,	21 22 49	
	18	I.	Tr. Ingr.	Ext. contact	,,	,,	21 39 47	21 40
	18	I.	,,	Bisection	,,	,,	21 41 37	
	18	I.	,,	Int. contact	,,	,,	21 43 51	
	29	II.	Ecl. R.	First seen	,,	130	23 32 55	23 32 34
	29	II.	,,	Full brightness	,,	,,	23 35 55	
Nov.	1	IV.	,,	First seen	,,	...	0 5 44	0 9 30
	1	IV.	,,	Full brightness	,,	...	0 16 28	
	2	III.	Occ. D.	First contact	,,	...	21 16 27	21 17
	2	III.	,,	Bisection	,,	...	21 18 37	
	2	III.	,,	Last seen	,,	...	21 21 6	

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Day of Obs. 1891.	Satellite.	Phenomenon.	Phase.	Aperture of Telescope.	Mag. Power.	Greenwich Mean Time of Observation. h m s	Mean Time of *Nautical Almanac.* h m s
Nov. 2	I.	Occ. D.	First contact	8-inch	130	22 34 14	22 38
2	I.	,,	Bisection	,,	...	22 37 29	
2	I.	,,	Last seen	,,	...	22 39 43	
14	II.	Tr. Egr.	Int. contact	,,	200	21 18 0	21 24
14	II.	,,	Bisection	,,	,,	21 20 15	
14	II.	,,	Ext. contact	,,	,,	21 22 29	
25	I.	Occ. D.	First contact	4½-inch	300	22 45 21	22 46
25	I.	,,	Bisection	,,	,,	22 47 6	
25	I.	,,	Last seen	,,	,,	22 48 26	
Dec. 16	II.	Tr. Egr.	Bisection	8-inch	130	21 12 38	21 11
16	II.	,,	Ext. contact	,,	,,	21 14 58	
19	I.	,,	Int. contact	4½-inch	180	22 29 16	22 32
19	I.	,,	Bisection	,,	,,	22 31 16	
19	I.	,,	Ext. contact	,,	,,	22 33 36	
27	I.	Ecl. R.	First seen	,,	90	23 3 27	23 2 41
27	I.	,,	Full brightness	,,	,,	23 5 14	

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Remarks.

Aug. 20.—Fair definition.

Sept. 2.—Good definition. Satellite appeared as a narrow band of light parallel to the planet's limb.

Sept. 3.—Excellent definition; internal contact noted rather late.

Sept. 10.—Planet's limb boiled violently after the bisection. Sky beautifully clear at the reappearance, and the satellites perfectly tranquil circular discs. These measures with the filar micrometer, which were very consistent, gave 47″·57 as the polar diameter of the planet.

Sept. 11.—Satellite I. fairly defined, but there was a slight boiling at the egress of the shadow. Definition bad at ingress, but good at egress, of II.

Sept. 18.—Good definition throughout for I., and for first two phases of II. Images tremulous at internal contact of II.

Sept. 20.—Images steady and well defined, but seen through thin cloud.

Sept. 27.—The three satellites on the west side of the planet were circular, tranquil discs, but that next to the planet was very hazy and indistinct as compared with the brilliancy of the others.

Oct. 1.—Images steady and pretty well defined, but III. unusually faint at internal contact, and appeared oval along the limb.

Oct. 3.—Sky clear and Moon absent; definition pretty good.

Oct. 4.—Definition of I. pretty good and of II. excellent. Observations unusually good.

Oct. 8, 9.—Definition good throughout.

Oct. 10.—Definition pretty good at first contact, but bad at the two other phases.

Oct. 11.—Images very steady and beautifully defined. Observations made with unusual precision.

Oct. 12.—Clear sky, and strong twilight; images fairly defined, but rather tremulous.

Oct. 14.—Satellite faint and slightly dusky.

Oct. 18.—Images tremulous.

Oct. 29.—Sky clear, and steadiness and definition satisfactory.

Nov. 1.—Sky clear and definition good. During the reappearance the planet was occulted by one of the bars of the square micrometer. The recovery of light was so excessively slow that it was impossible to fix the time of full brightness with any approach to accuracy.

Nov. 2.—Images steady and well defined.

Nov. 14.—Excellent definition; internal contact noted late.

Nov. 25.—Definition pretty good, and sky hazy.

Dec. 16.—Images tremulous, and badly defined in strong twilight.

Dec. 19.—Sky beautifully clear, but definition bad.

Dec. 27.—Definition pretty good. Sky free from cloud, but slightly hazy from smoke.

Note.—With the exception of Nov. 1 an occulting bar was not employed in the observations of the eclipses for 1891. The times given in the first and seventh columns are the Windsor mean times of observation diminished by $10^h\ 3^m\ 20^s{\cdot}5$, and entered to the nearest second.

Private Observatory, Windsor, N. S. Wales.
1892 *June* 5.

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Observations of U Orionis. By Lieutenant-Col. E. E. Markwick.

The following are my observations of the above star in 1892, made with a binocular magnifying five times:—

	m			m
Jan. 1	9	Just glimpsed.	1892 Feb. 1	6·37
3	8·65		23	6·57
5	8·2	Visible in moonlight.	24	6·57
6	7·6		25	6·4
21	6·27		26	6·8
24	6·32		Mar. 22	7·9
25	6·27		28	8·3
27	6·32		30	8·8
29	6·37			

The magnitudes are on the H.P. scale as nearly as may be. The maximum appears to have occurred about January 23; but the change of brightness of this star about this period is so slow that it is somewhat difficult to allocate the maximum with certainty. Assuming it to have been at maximum on December 13, 1885, when first discovered by Gore, we have an interval of 2,232 days to January 23 this year, during which six periods elapsed. Hence the mean period would be 372 days. As, however, this is perhaps rather a hazardous assumption, let us take 1886 December 12 as a well-determined maximum. This is the mean of four observers—viz. Gore, December 11; Markwick, December 16; Sawyer, December 13; and Parkhurst, December 9. From 1886 December 12 to 1892 January 23 is 1,868 days, or five periods, which will give the mean as 373·6 days. This last is identical with the first value given by Gore on p. 518, vol. l., of the *Monthly Notices*, and also only differs from his provisional value (373·47 days) by 0·13 day. This is, of course, on the assumption that all these periods are identical in length. If, as Chandler supposes, there is some slow, gradual lengthening or dwindling of the period by a periodic term, then a very much longer series of observations will have to be obtained before this can be definitely ascertained.

Haulbowline, Queenstown:
1892 *September.*
